GEOTECHNICAL INVESTIGATION
HANSON LANE SUBDIVISION
(ESTATES AT MCDONALD PARK)
TM5136 RPL 2
HANSON LANE
RAMONA, CA

Prepared for:

Mr. Dick Bottomley
J. H. Partners
15750 Thomas Paine Dr.
Ramona, CA 92065

S.E.A. 204135-01
June 11, 2004

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15750 Thomas Paine Dr.
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SUBJECT: Geotechnical Investigation
Hanson Lane Subdivision (Estates at M
TM 5136 Rpl 2
Hanson Lane
Ramona, CA

Wrong ?

Dear Mr. Bottomley:

In accordance with our proposal of April 2, 2004, we herein submit our report of a geotechnical investigation for the Estates at McDonald Park (TM 5136, Rpl 2), in Ramona, California. In this report, we present our findings, conclusions and recommendations relevant to the proposed grading and the design of footings, slabs, retaining walls and other construction elements. In our opinion, the site can be graded as shown on the grading plan as prepared by Pountney Psomas, dated May 19, 2004, provided that the recommendations presented in this report are followed.

Soil conditions onsite vary somewhat with elevation. Our exploratory backhoe trenches encountered deep colluvial soils on the northernmost portion of the property overlying decomposed granite; these soils shallow as elevation increases, with near-surface deeply weathered bedrock encountered on the steeper slopes on the southerly portions of the site. The property is underlain at shallow depths by a clay with high expansion potential. A complete discussion of this soil and measures to mitigate the effects of expansion are presented in this report.

Please review our report and contact us with any questions. We appreciate the opportunity to be of continued service.

Respectfully Submitted,

SHEPARDSON ENGINEERING ASSOCIATES

Bryan Miller-Hicks, CEG
Project Geologist

William E. Ellis, RCE/GE
Senior Geotechnical Engineer/Vice President

REGISTERED PROFESSIONAL ENGINEER
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STATE OF CALIFORNIA

cc (5) to Addressee

Enclosures

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GEOTECHNICAL INVESTIGATION
HANSON LANE SUBDIVISION (ESTATES AT MCDONALD PARK)
TM 5136 RPL 2
HANSON LANE
RAMONA, CALIFORNIA

June 11, 2004 S.E.A. 204135-01

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation for a residential subdivision map to be developed on the south side of Hanson Lane, east of Hanson Way, in Ramona, California. Our services have been completed in conformance with our proposal dated April 2, 2004. The civil engineers for this project are Pountney Psomas.

2.0 PROJECT AND SITE DESCRIPTION

The Estates at McDonald Park property is an approximately 12 acre, L-shaped parcel. The grading plan indicates a proposed subdivision of 11 lots. Plate No. A2 is a site plan, showing all lots, proposed grading, and the location of our exploration excavations.

Minor cuts and fills are proposed for residential pad grading, with maximum cut and fill depths of 5 to 7 feet. Retaining walls are planned for the cut slopes created for grading of pads on Lots 1 and 11.

3.0 SCOPE OF WORK

The scope of the geotechnical investigation conforms to that described in our proposal of April 2, 2004. The scope included the following tasks:

1) Geologic reconnaissance and review of local and regional soil and geologic information

2) Excavation of eight backhoe test trenches and collection of representative soil samples

3) Laboratory testing of selected soil samples to assess strength and supporting characteristics

4) Engineering analysis and preparation of this report

A detailed description of field exploration and laboratory testing ins presented in a subsequent section of this report.

4.0 FINDINGS

4.1 Site Description

The site is an L-shaped parcel, abutting Hanson Lane on the south side, and extending south some 1200 feet. It is approximately 12 acres in size. It generally ascends to the south at a gentle slope, with significant steepening to a rocky knob in the southeast corner of the site.

Elevations on the property range from a low of approximately 1430 msl at Hanson Lane to the north, to a high of 1550 atop the rocky knob in the southeast corner of the site. The site is mostly vacant, with a wild grass cover, and a few trees on Lot 5 and on the rocky knob. An existing well is located near the northeast corner of the site, in Lot 5. A house and outbuildings, which will be demolished for the new development, occupy Lot 6. There is an existing house and outbuildings on Lot 10, at the southwest corner of the property, which will remain. Portions of Lot 9, to the north of Lot 10, are occupied by a small pad constructed of undocumented fill.

4.2 Geology and Subsurface Conditions Encountered

The property is underlain by three geologic units: Colluvium, which overlies decomposed granite, or weathered metasediments. Trench logs, on Plates B2 through B9, present detailed descriptions of subsurface conditions.

Our test trench excavation TP-1 indicates that colluvium and residual soils are as much as 8 feet thick in the northernmost portions of the property. The colluvial deposits in TP-1 range from a moderately cemented to a dense, cemented silty sand. The colluvial/residual soils thin significantly within a relatively short distance to the south, or uphill. They are only 2.5 feet thick in TP-2, some 250 feet to the south. The colluvium and residual soils onsite can be generally described as a thin and dry silty sand, overlying a moist to wet sandy clay. Generally the clay is medium stiff in its moist, natural state. These clays are potentially expansive and are discussed in greater detail in a subsequent section of this report.

The decomposed granite geologic unit underlies most of the gently sloping portions of the property, and consists of coarse, olive gray silty sand, dense, and comprising excellent foundation material.

As the site slopes upward, the character of the bedrock changes, transitioning to a metasedimentary bedrock which is deeply weathered. Excavated cuttings are a fine to coarse silty sand, orange to yellow in color. Although still dense, the material was easily excavated with a backhoe. This indicates that the proposed deeper cuts on lots 10 and 11 will be excavated in rippable material.

4.3 Faults and Seismicity

The tectonic setting of the San Diego area is characterized by Quaternary age fault zones which typically consist of a number of faults that generally strike in a northerly to northwesterly direction.

Active fault zones likely to produce earthquakes of significant magnitude which could produce ground shaking effects at the site include the Rose Canyon Fault Zone, Elsinore Fault Zone, and the Coronado Bank Fault Zone. Other more distant fault zones are located generally to the north and northeast. Table No. 1 below lists the various fault zones, their distance from the site, the maximum magnitude anticipated, slip rate, and estimated length.

TABLE NO. 1
SEISMIC SOURCE SUMMARY

Source Name	Maximum Magnitude, M_w	Estimated Slip Rate (mm/year)	Estimated Length (km)	Estimated Closest Distance to Site* (km)
Rose Canyon B	6.9	1.5	81	39
Coronado Bank	7.4	3.0	387	61
Elsinore-Julian A	7.1	5.0	202	24
Earthquake Valley	6.5	2.0	32	32
Newport-Inglewood offshore	6.9	1.5	106	54
Elsinore (Temecula)	6.8	5.0	42	41
Elsinore- (Coyote Mtn.)	6.8	4.0	61	48

A = nearest Type A fault B = nearest Type B fault

* The distances shown in this table are measured from the site to the faults modeled as linear segments; these distances may be slightly different from the actual distances from the site to mapped faults.

4.4 UBC Seismic Design Parameters

The design coefficients provided in Table 2 are for use with the 1997 Uniform Building Code, Chapter 16.

TABLE 2

SEISMIC DESIGN PARAMETERS

(1997 UBC - CHAPTER 16)

Parameter	Value	UBC Reference
Seismic Zone Factor, Z	0.40	Table 16-I
Soil Profile Type	S_B	Table 16-J
Seismic Coefficient, C_a	0.40	Table 16-Q
Seismic Coefficient, C_V	0.40	Table 16-R
Near-Source Factor, N_a	1.0	Table 16-S
Near-Source Factor, N_V	1.0	Table 16-T
Control Period, T_S	0.400	Figure 16-3
Control Period, T_O	0.080	Figure 16-3

The computation data for the above parameters is provided in Appendix E. The Design Response Spectrum plot is included also.

4.5 Liquefaction and Other Seismic Hazards

It is our opinion due to the high in-situ density of the dense formational soils and their grain-size characteristics, the liquefaction potential, and the risk of significant seismic settlement is very low.

4.6 Landslides

Ancient, massive landslides within crystalline, granitic rock have been identified in San Diego County. We are familiar with the geomorphic features indicative of such landslides from our experience on other projects. During our investigations of the project site we did not observe any evidence of existing landslides within or near the proposed development site.

4.7 Groundwater

No free groundwater was encountered during our exploration of the site. However, intermittent seepage may occur on cut slopes, most likely during, or after periods of heavy precipitation or excessive irrigation. Where exposed, seepage may occur at the interfaces with the bedrock formation or at the contact between filled ground and the native ground. The occurrence of seepage and/or the development of perched water tables may be encountered in developed areas which are heavily irrigated. It is not possible to predict the point of occurrence of seepage areas. If seepage should occur, subdrains should be installed to intercept and discharge such waters.

4.8 Erosion Potential

Proposed cut slopes for Lots 1 and 11 will be excavated predominantly in weathered bedrock materials. These slopes will not be susceptible to significant erosion, but can develop rills if exposed to concentrated water flows across unvegetated surfaces. Slope drainage should be designed to minimize the amount of water allowed to collect on any slope and a vegetative ground cover should be established as soon as possible.

Cut slopes for other lots may be constructed partially in colluvial soils and partially in bedrock materials. The clayey materials will not be highly susceptible to erosion, however surface drainage and landscaping on these slopes is recommended.

4.9 Artificial Fill

The artificial fill encountered in TP-5 on Lot 8 is undocumented, dry and loose, and contains debris. The fill can be re-used and recompacted after screening for large fragments of asphalt or other deleterious construction debris.

5.0 CONCLUSIONS

In our opinion the site can be prepared to be geotechnically suitable for the proposed development. An adverse geotechnical condition at this site is the very high expansion potential of the one to two foot layer of residual clay soils that were found at depths of 1 foot to 1.5 feet below the natural ground surface. Laboratory test results indicate that the Expansion Index (EI) of these clays is 174. This EI is rated very high, according to the Uniform Building Code Standard No. 29-2. These soils have the potential to undergo distressful volume changes, i.e. either expansion or shrinkage, when there are corresponding increases or decreases in the soil moisture content. The resulting uplift pressures can cause adverse differential movement and cracking of lightly loaded structure elements, such as concrete slabs-on-grade. The mitigation measures presented in later sections of this report are intended to remove the clay soils wherever encountered and then limit their reuse as fill to areas outside structures, hardscaping, and pavement.

With proper site preparation the graded sites should provide good support for shallow building foundations designed for moderate bearing capacities. Grading should not encounter great excavation difficulty since the granitic materials appear to be well weathered. Some deeper cut areas may expose less weathered, underlying bedrock that may require ripping.

6.0 RECOMMENDATIONS

6.1 Clearing and Stripping

In areas to be subject to grading, including cutting and filling, all surface vegetation and major root systems should be removed. The stripped material should be stockpiled and ultimately disposed of offsite.

6.2 Site Preparation

General site preparation prior to placement of fill will include the removal of all loose fill and clayey colluvium in areas supporting fills, structures or pertinent construction. The colluvial and residual soil removals should be carried down to contact with the underlying bedrock or decomposed granite. The expansive clay soils are suitable to be re-used as compacted fill only in areas outside of the building, hardscape and pavement areas. Removal and recompaction should encompass all materials beneath proposed fills, roadway, and buildable areas. Removal area boundaries should be extended laterally from the toe of proposed fills, to a distance equal to the removal depths; that is, at a 1:1 slope from the toe of the fill.

6.3 Fill Placement

It is recommended that the earthwork and grading for the site be accomplished in accordance with attached "Recommended Guide for Placement of Engineered Fill". The on-site materials are considered suitable for use as compacted fill, provided they are free of organic materials, debris, and oversize rock. Expansive clayey soils should be placed outside of structure, hardscape and pavement areas. Generally, it is preferred that rock fragments used in the fill be 12 inches or less in greatest dimension. Rocks up to 24 inches, and

occasionally up to 48 inches in size may be emplaced, as provided in the rock placement procedures discussed in a later section of this report.

The maximum dry density of each representative soil type used for fill should be determined in accordance with ASTM Test Procedure D1557-91. The soil moisture content prior to compaction should be not less than 2% above the optimum moisture content. The fill should be placed in horizontal lifts, not exceeding 12 inches in maximum loose thickness, or less, as needed to provide proper compaction. Following proper moisture conditioning, the fill may be then compacted to 90% of the maximum dry density.

6.4 Cut/Fill Transition Areas

Foundations supported partly on cut, and partly on fill, are not recommended. There is a tendency for cut ground and compacted fills to compress differentially, which may result in unequal structure support and distressful settlement under the structures. Therefore, in building areas with a transition from cut to fill, we recommend undercutting the cut portion of the pad to at least 24 inches below the base of the deepest foundation. Additional undercutting of cut/fill transition lots may be required where necessary to facilitate the construction of underground utilities where dense rock materials are encountered near finish grade.

6.5 Over-excavation of Exposed Rock Areas

Some grading will involve excavations which may expose hard rock at, or near, the finish subgrade level. In these areas it would be desirable to over-excavate the hard rock to a level below the finish subgrade, which is then replaced with engineered fill which may allow for easier construction and excavation of underground utilities, footings, other subsurface features, and landscaping elements. If blasting is required to facilitate removal, then all loose and disturbed materials must be carefully removed and replaced with the compacted fill material.

6.6 Rock Placement Procedures

Limited amounts of large size rock may be placed in selected regions of the compacted soil rock fill in accordance with the oversize material placement detail presented on Plate A7 of Appendix A. In accordance with this guideline, rocks up to a maximum of 24 inches may be placed in Zone C, which is in deeper portions of the main fill. Rocks in the upper portion of the fill (Zone A) should be limited to 12 inches in size. The depth of Zone A may be reduced from the 10 feet shown to 5 feet in building areas, however, we recommend that all future owners be notified in writing that excavations extending below the base of the Zone A level selected may encounter rock up to 2 feet in maximum dimension.

Rocks greater than 2 feet, but less than 4 feet, may be placed provided there is sufficient room to accommodate their placement in accordance with the details shown on Zone B of Plate A6. There appear, however, to be very limited areas in the project to accommodate any significant volume of rock in the 2 to 4 feet size range, in accordance to this detail. Please note that during construction of the soil/rock fill, at least 40% of the mass must consist of materials less than No. 4 sieve size. In all cases, the proximity, placement and selection of material size gradation should provide an absence of voids within the compacted fill mass.

6.7 Earthwork Factors

We have attempted to estimate the anticipated volume changes which may occur for the various native materials encountered at this site, which are excavated and then subsequently incorporated into compacted fills. These volume change values have been provided to assist the project civil engineer in estimating earthwork volumes that may be involved during grading. The following table presents the estimated earthwork factors, summarized for general types of materials found at the site, that are subsequently compacted to 90% of the maximum dry density as referenced in this report.

EARTHWORK FACTORS

Soil Type	Estimated Shrinkage (-) or Bulking (+) as Percent of In-situ Density
Alluvium and colluvium	-5% to -10%
Decomposed granite (d.g.)	0% to +5%
Marginal/non-rippable rock	+10% to 15%

It should be noted that the current state of practice does not allow for accurate estimates of earthwork factors. There are many variables affecting such estimates that cannot be accurately quantified. Therefore, the above earthwork values are very approximate, and contingencies should be included in the grading plan design to accommodate a variation in the actual earthwork volumes, that may be encountered during grading, that differs from the above estimates.

6.8 Cut/Fill Slope Construction

Cut and fill slopes may be constructed at a ratio no steeper than 2 horizontal to 1 vertical (2:1) for the height planned. These recommended slope ratios are intended to provide slopes with a static factor of safety in excess of 1.5 against deep-seated rotational movement. The risk for shallow surficial failures within cut or fill slopes is calculated to be minimal providing that excessive, uncontrolled landscape irrigation and/or surface drainage upon the slopes is prevented.

Cut slopes, during and/or immediately following excavation, should be inspected by an engineering geologist to review for possible adverse bedding or other unexpected, adverse natural ground conditions that may affect the conclusions and recommendations herein.

6.9 Erosion Protection Measures

Interim erosion protection measures may be needed if there is a risk that the finish grade will be exposed to heavy rainfall prior to the establishment of the permanent erosion protection system. A landscape expert should be involved in design of the permanent erosion resistant vegetation plan which would be implemented soon following grading. It may be necessary to implement temporary irrigation measures in order to propagate the erosion resistant vegetation in a timely manner in advance of the rainfall season.

6.10 Drainage

Positive drainage must be provided to direct all surface waters away from foundations, slabs and pavement/hardscaping. Planters, walkways, and landscaping should be designed to allow for positive gradients with no impoundment of water adjacent to foundations or pavement/hardscaping. Area drains should be incorporated as needed to assist in an overall drainage plan. Irrigation systems should be designed and controlled to minimize water application and periodically adjusted, as needed, for seasonal demand.

Good drainage, both at the end of construction and during the life of the improvements, is imperative for the continuous satisfactory performance of the foundations and ground supported systems. Poor drainage and excessive irrigation are a common cause of building/pavement support problems.

6.11 Foundations

It is our understanding that the lots are to be developed for single family residences. We assume the homes will be wood framed, and either one- or two-story construction. The following foundation parameters are based on this anticipated use:

Allowable soil bearing pressure:	2500 lbs/sq. ft. (may be increased 33% for wind or seismic loading)
Footing Embedment Depth:	12 inches and 18 inches below lowest adjacent finished soil grade for 1- and 2-story construction, respectively
Minimum Reinforcement:	One No. 4 bar near top and one No. 4 bar near bottom

Footings for buildings, walls, fences, and landscaping that are constructed close to the top of a descending cut or fill slope are subjected to diminished support due to reduced lateral support of soils near the slope face. The base of foundations, including buildings, retaining wall, garden wall, fences, and other settlement-sensitive features, should be placed no closer than 8 feet horizontally from the nearest face of slope. If it is desired to place a footing closer than 8 feet, then the base of the footing should extend 12 inches below a depth that provides 8 feet of horizontal clearance from the base of the footing to the nearest slope face.

Adjacent footings founded at different bearing levels should be located so the slope from bearing level to bearing level is flatter than 1 horizontal unit to 1 vertical unit (1:1).

6.12 Slabs-on-Grade

Concrete slabs-on-grade may be supported on compacted fills when prepared as recommended in the previous sections of this report.

We recommend the concrete slabs-on-grade be no less than 4 inches in thickness and reinforced with No. 3 reinforcing bars, spaced at 24 inches each way, placed at mid-slab height. Chairs or other supporting devices should be used to maintain the reinforcement at the proper level during concrete placement.

To minimize the intrusion of moisture vapor to the interior of structures through the concrete slabs, we recommend that a moisture vapor barrier consisting of 10 mil., or thicker, PVC film, or equivalent, be placed below the slabs. The moisture vapor barrier should be overlain by clean, moist sand, no less than two inches in thickness. The sand blanket is intended to provide protection of the moisture barrier during the concrete slab placement, and to promote more uniform curing of the concrete slab. Furthermore, the membrane should be underlain by at least two inches of clean, coarse sand or fine gravel placed between the base of the membrane and the underlying subgrade.

Plastic and/or shrinkage cracking of large concrete slabs is a frequent occurrence and is unrelated to the quality of the subgrade support. Concrete shrinkage cracking can be minimized by careful design and preparation of the concrete mix, as well as quality workmanship during placement/finishing/curing.

6.13 Exterior Slabs-on-Grade

For sidewalks, patios, and other exterior hardscaping, we recommend a minimum slab thickness of four inches. The exterior slabs should be reinforced with 6 x 6 - 10/10 welded wire mesh placed at mid-slab height. Water tight crack control and expansion joints should be provided in swimming pool decks.

Exterior slabs, pool decks, or other hardscaping within 10 feet of the top of high cut or fill slopes may be subject to lateral/vertical movement due to normal "slope creep" or lateral fill extension. To minimize these effects it is recommended that the slab edge, furthest from and paralleling the slope edge, be provided with a thickened edge that is 12 inches wide and extends 6 inches below the bottom of the slab.

7.0 SUPPORTING INVESTIGATION DATA AND PROCEDURES

7.1 Subsurface Exploration

Subsurface exploration at this site consisted of 8 test trenches excavated with backhoe excavating equipment. The equipment was a backhoe utilizing an 18" wide bucket. The locations of the test explorations are approximately as shown on Plate No. A1. The exploration locations were determined in the field by visual estimates and pacing from fixed references.

The logging of the exploratory trenches was performed by a Geologist from our staff. The field logging consisted of preparing a graphic summary, containing visual classifications of the soil and rock encountered in the explorations based on examinations of cuttings brought to the surface by the equipment, and observations of exposed trench walls and bottom.

Both disturbed and relatively undisturbed bulk samples were obtained at representative intervals within the explorations. These samples were retained within moisture proof bags and transported to our laboratory for further classification and testing.

7.2 Presentation of Exploratory Data

Descriptive logs of each test exploration are presented on Plate Nos. B2 through B9 in Appendix B. These logs provide a graphic summary of the features observed. The summary includes: (a) a genetic description of the earth material encountered; (b) an engineering description of the earth material; (c) the field estimate of soil competency, moisture, and color; (d) a graphic description of the relative position of these materials with respect to the ground surface and each other; (e) our estimate of the relative position and vertical extent of either free water or zone of saturation with respect to time and; (f) the results of certain laboratory tests and a symbolized summary of all other laboratory tests performed. The symbols and other descriptive characters used on the logs are defined on the Explanation of Logs attached as Plate B1.in Appendix B.

The engineering descriptions provided on the Logs are a product of one or more of the following: (a) visual classification by the field representative observing the explorations using ASTM procedures D-2488-84; (b) laboratory testing using ASTM test procedure D-2487-85 and; (c) interpretation of the results of (a) and (b) above by the project Geotechnical Engineers. Genetic descriptions are based on terminology developed by the United States Geological Survey and the American Geological Institute.

7.3 Laboratory Testing

7.3.1 In-Place Moisture and Density:

Field moisture content and in-place density were determined for selected samples of undisturbed soil material obtained. The field moisture content was determined according to ASTM Test Method D2216-66. The in-place dry density of samples was determined by using the net weight of each entire sample. The results of the field moisture content and in-place density determinations are presented on the logs, in Appendix "B".

7.3.2 Laboratory Compaction Tests:

Bulk samples, representative of the major soil types onsite, were tested to determine its maximum dry density and optimum moisture content. These compactive characteristics were determined according to ASTM Test D1557-91 (Method A). The results are presented in Appendix "C" under "Compaction Curve".

7.3.3 Direct Shear Test:

Consolidated, drained, direct shear tests were performed on remolded samples of onsite soil. The direct shear tests were performed using a sample 2.375 inches in diameter and 1 inch in height. Normal stress was applied through a loading frame. The samples were sheared at the rate shown on the Direct Shear Test Data

Sheet. The applied normal and shear forces were monitored by electronic load cells, and displacement in the normal and shear directions were monitored by linear variable displacement transducers (LVDT's). The force and displacement in the direction of shear were plotted electronically on an x-y plotter. The results of the tests are presented in Appendix C as Direct Shear Test Data.

7.3.4 Expansion Test

The one dimensional expansion of a sample of onsite clay soils was evaluated. The test was performed according to the Uniform Building Code, Standard No. 29-1 (International Conference of Building Officials). The results from this test procedure are reported as an "Expansion Index" and are presented in Appendix C, Plate C-1.

8.0 ADDITIONAL SERVICES

This report completes our currently authorized scope of services for this project. Continued coordination between the design engineer, client and our office is recommended in order to facilitate communication and accurate incorporation of the geotechnical recommendations into the project design. It is recommended that the final plans and specifications be reviewed by the geotechnical engineer as a means for documenting that the design is compatible with the geotechnical conditions defined by this investigation. During the construction phase, a program of geotechnical testing, monitoring, and observation should be undertaken by the Geotechnical Engineer's representatives. These services are intended to permit the Geotechnical Engineer to express the opinion that the geotechnically related work is in conformance with the project specifications and plans, and to document any changes made during construction. Site preparation, grading, and placement of fill and backfill should be subjected to the testing and observation of the Geotechnical Engineer's representative. The above services are not included as part of our current, authorized contract. An additional contract covering these services will be provided by our firm upon request.

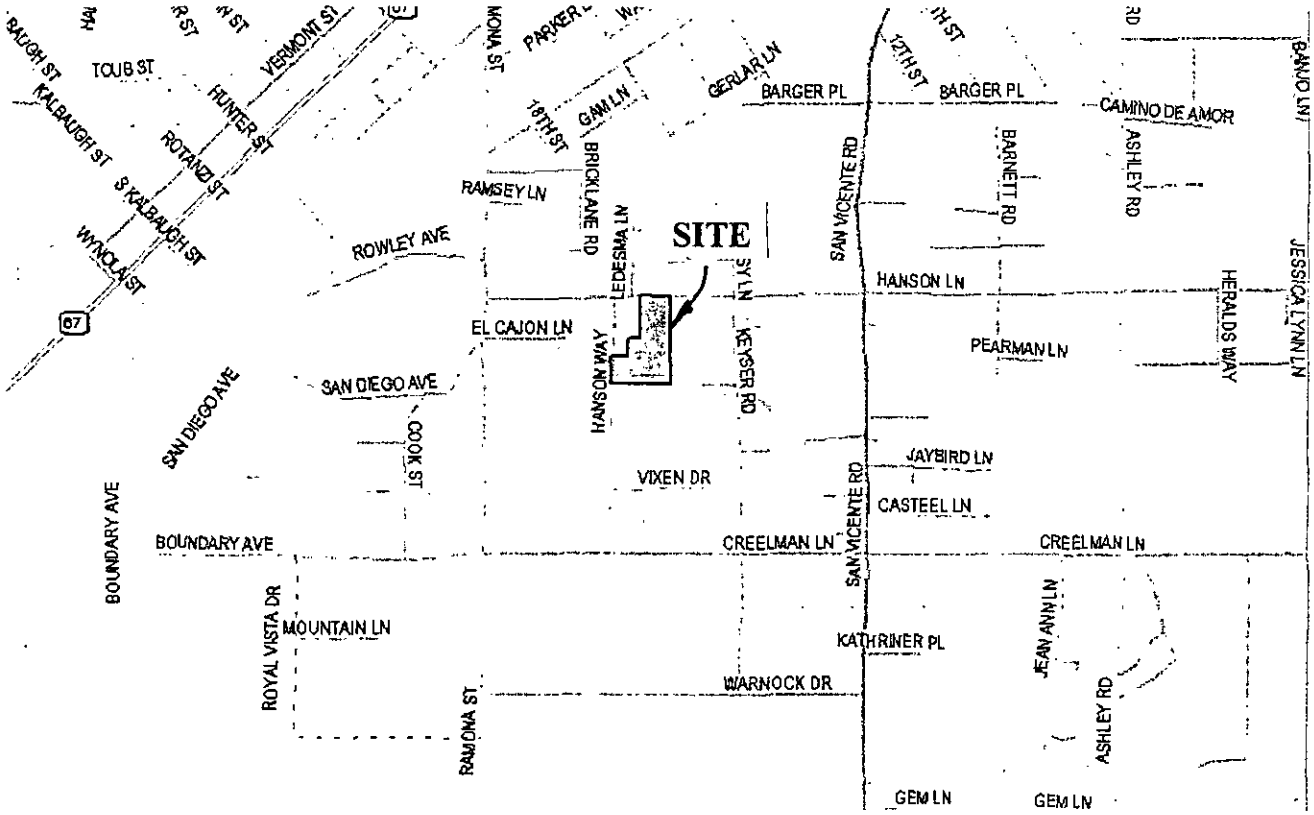
9.0 LIMITATIONS

The services provided under this contract, as described in this report, include the professional opinions and judgments based on the data collected. These services have been performed in accordance with current local and generally accepted geotechnical engineering practices. The recommendations contained herein are based upon information obtained from the test borings and/or trenches, observations of our personnel, results of laboratory tests, and our experience in the area. The test explorations do not provide a warranty as to the conditions which may exist between the points of exploration. The nature and extent of subsurface variations may not become evident until earthwork construction occurs. If conditions are encountered in the field which differ from those described in this report, our firm must be contacted immediately to review these conditions and provide any necessary revisions to the recommendations contained in this report.

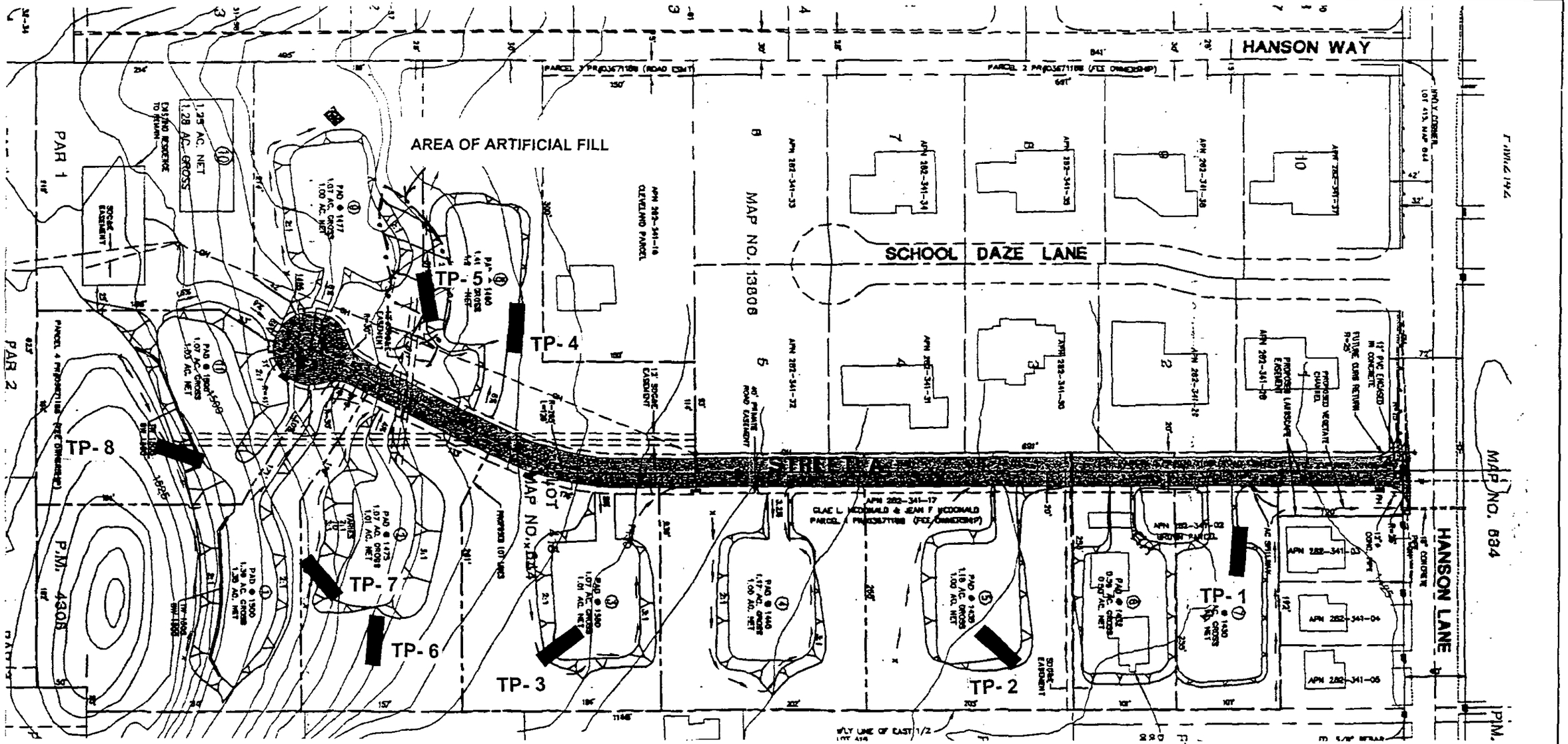
The findings of this report are valid as of this present date. Changes in the geotechnical conditions of the property can occur with the passage of time, whether they are due to natural processes or the work of man on this or adjacent properties. This report should not be used after a period of three (3) years except following a review and written update by this office. In addition, this report is invalid for any use beyond the limits of the project or for any construction not described herein.

This report is intended for the sole use of the client and/or their design consultant(s). It is the client's duty to inform the architect/engineer of the contents of this report and ensure that the recommendations herein are incorporated into the project plans. The client and architect/engineer should also ensure that the contractor and subcontractors implement such recommendations during construction.

APPENDIX A



SHEPARDSON ENGINEERING ASSOCIATES INC. *Geotechnical Consultants:* *Engineers-Geologists*	Date: June 2004	Project No:204135-01	Plate
	Vicinity Map ***Hanson Lane (McDonald Park)*** ***Ramona, California***		***A1***



Scale: 1" = 100'

TEST PIT LOCATION TP- 1

SHEPARDSON
ENGINEERING ASSOCIATES INC.

Geotechnical Consultants:
Engineers-Geologists

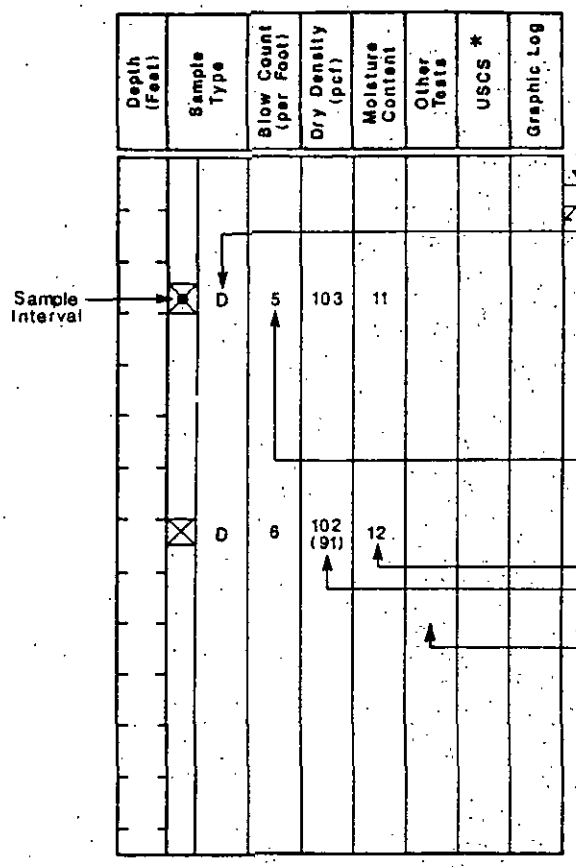
Date: June, 2004 | Project No: 204135-01 | Plate

SITE PLAN
Hanson Lane (McDonald Park)
Ramona, California

A2

APPENDIX B

KEY TO LOG



Level of Free Water & Date Measured

Seepage at Time of Boring

TYPE OF SAMPLE OR SAMPLER

- SS = Standard Penetration Test Sample (ASTM)
- SC = Sand Cone Density Test
- H = California Sampler (3"O.D., 2.375" I.D.)
- S1 = Shelby Tube (3"O.D.)
- S2 = Shelby Tube (2.5"O.D.)
- PB = Pitcher Barrel (3"O.D.)
- ● = Unable to Retrieve Sample
- B = Bulk Sample
- C = Chunk Sample

NUMBER OF BLOWS FOR LOWER 12" OF DRIVE SAMPLE

When SS Sampler Used, Blows are Taken Using 140lb Hammer-30" Drop Energy Criteria on Log for Other Samplers

- P = Push Under Hammer Weight

MOISTURE CONTENT (Percent Dry Weight)

DRY DENSITY (Pounds Per Cubic Foot)

- (R) = Relative Compaction

OTHER TESTS PERFORMED

- SG = Specific Gravity
- DS = Direct Shear
- UC = Unconfined Compression
- TC = Triaxial Compression
- RS = Residual Shear
- CN = Consolidation
- EX = Expansion
- EI = Expansion Index
- MD = Maximum Density-Optimum Moisture
- SE = Sand Equivalent
- GS = Grain Size Determination
- PM = Permeability
- AL = Atterburg Limits
- R = R-Value
- CBR = California Bearing Ratio
- CH = Chemical Tests

NOTES: These final logs represent Shepardson Engineering Associates' interpretation of the subsurface conditions on the date of exploration based on field logs in combination with the results of laboratory examination and tests of representative field samples. Therefore, these logs contain both factual and interpretative information. The logs represent subsurface conditions on the dates and at the locations indicated and are not necessarily representative of subsurface conditions at other times or locations.

The horizontal lines represent the approximate generic and/or lithologic boundary between types of soils and/or rock material . The actual transition may be gradual.

The logs summarize only a portion of the geotechnical report. They should not be reproduced for distribution while separated from the body of the report and the data contained on the logs should only be used in conjunction with the report.

"Refusal" indicates inability to extend excavation practically or economically with the exploration equipment used.

LOG OF TEST TRENCH TP- 1

Date Excavated: 5/20/04 Excavation Equipment: Case 580 Extendahoe

Logged By: BMH Method/Trench Width: Backhoe/18" Elevation: ~1432'

Depth (feet)	Sample Type	Dry Density (pcf)	Moisture Content (%)	Lab Tests	USCS	Graphic Log	MATERIAL DESCRIPTION
0					SM		COLLUVIUM: silty fine sand, dry to moist, loose, red brown; porous
3	C	116	10.7		SM		COLLUVIUM: silty sand, medium dense, moist, red brown; few pores, cemented
5	C	126	11.0		SM		COLLUVIUM: silty sand, dense, moist, olive gray to red brown and yellow brown, firmly cemented
8					SM-SW		COLLUVIUM/ALLUVIUM: silty sand to well-graded sand, medium dense, wet, olive gray to pale green
8					SM		DECOMPOSED GRANITE: silty coarse sand, dense, humid, light gray
8.5							Bottom of trench at 8.5 feet

Remarks:

Please refer to symbols and note limitations shown on "Explanation of Logs"

SHEPARDSON ENGINEERING ASSOCIATES INC.

Geotechnical Consultants: Engineers-Geologists

Date: June, 2004 Project No.: 204135-01

Log of Test Trench TP- 1

Hanson Lane

Plate B2

1 of 1

TR1 04

LOG OF TEST TRENCH TP- 2

Date Excavated: 5/20/04 Excavation Equipment: Case 580 Extendahoe

Logged By: BMH Method/Trench Width: Backhoe/18" Elevation: ~1435'

Depth (feet)	Sample Type	Dry Density (pcf)	Moisture Content (%)	Lab Tests	USCS	Graphic Log	MATERIAL DESCRIPTION
					SM		COLLUVIUM: silty fine sand, dry, loose, medium brown
1					CL		COLLUVIUM: sandy clay, medium stiff, moist, red brown
2	C	119	13.3				
					SM		DECOMPOSED GRANITE: silty coarse sand, dense, humid, olive gray
3							
4							Bottom of trench at 3.5 feet
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							

Remarks:

Please refer to symbols and note limitations shown on "Explanation of Logs"

SHEPARDSON ENGINEERING ASSOCIATES INC.

Geotechnical Consultants: Engineers-Geologists

Date: June, 2004 | Project No.: 204135-01

Log of Test Trench TP- 2

Hanson Lane

Plate B3

1 of 1

TR1 04

LOG OF TEST TRENCH TP- 3

Date Excavated: 5/20/04 Excavation Equipment: Case 580 Extendahoe

Logged By: BMH Method/Trench Width: Backhoe/18" Elevation: ~1451'

Depth (feet)	Sample Type	Dry Density (pcf)	Moisture Content (%)	Lab Tests	USCS	Graphic Log	MATERIAL DESCRIPTION
1					SM		COLLUVIUM: silty sand, loose, dry, medium brown
2	B	98	12.7	EI	CL		COLLUVIUM: sandy clay, medium stiff to stiff, moist to wet, red brown
3					SM		DECOMPOSED GRANITE: silty coarse sand, dense, humid, olive gray
4							Bottom of trench at 4 feet
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							

Remarks:

Please refer to symbols and note limitations shown on "Explanation of Logs"

SHEPARDSON ENGINEERING ASSOCIATES INC.

Geotechnical Consultants: Engineers-Geologists

Date: June, 2004 | Project No.: 204135-01

Log of Test Trench TP- 3

Hanson Lane

Plate B4 1 of 1

TR1 04

LOG OF TEST TRENCH TP- 4

Date Excavated: 5/20/04 Excavation Equipment: Case 580 Extendahoe

Logged By: BMH Method/Trench Width: Backhoe/18" Elevation: ~1460'

Depth (feet)	Sample Type	Dry Density (pcf)	Moisture Content (%)	Lab Tests	USCS	Graphic Log	MATERIAL DESCRIPTION
1					SM		COLLUVIUM: silty sand, dry, loose, medium brown
2					CL		COLLUVIUM: sandy clay, medium stiff, wet, dark red brown
3					SM		FRACTURED BEDROCK/METASEDIMENTS: silty medium sand, dense, humid, orange brown to yellow brown
4							Bottom of trench at 4 feet
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							

Remarks:

Please refer to symbols and note limitations shown on "Explanation of Logs"

SHEPARDSON ENGINEERING ASSOCIATES INC.

Geotechnical Consultants: Engineers-Geologists

Date: June, 2004 | Project No.: 204135-01

Log of Test Trench TP- 4

Hanson Lane

Plate B5 1 of 1

TR1 04

LOG OF TEST TRENCH TP- 5

Date Excavated: 5/20/04 Excavation Equipment: Case 580 Extendahoe

Logged By: BMH Method/Trench Width: Backhoe/18" Elevation: ~1470'

Depth (feet)	Sample Type	Dry Density (pcf)	Moisture Content (%)	Lab Tests	USCS	Graphic Log	MATERIAL DESCRIPTION
0					SM		**ARTIFICIAL FILL:** silty fine sand, loose to very loose, damp, contains chunks of asphalt and concrete to 2' *maximum* dimension
6					CL		**COLLUVIUM:** sandy clay, medium stiff, moist, red brown
8							Bottom of trench at 8 feet

Remarks:

Please refer to symbols and note limitations shown on "Explanation of Logs"

SHEPARDSON ENGINEERING ASSOCIATES INC.

Geotechnical Consultants: Engineers-Geologists

Date: June, 2004 | Project No.: 204135-01

Log of Test Trench TP- 5

Hanson Lane

Plate B6

1 of 1

TR1 04

LOG OF TEST TRENCH TP- 6

Date Excavated: 5/20/04 Excavation Equipment: Case 580 Extendahoe

Logged By: BMH Method/Trench Width: Backhoe/18" *Elevation:* ~1470'

Depth (feet)	Sample Type	Dry Density (pcf)	Moisture Content (%)	Lab Tests	USCS	Graphic Log	MATERIAL DESCRIPTION
0					SM		**COLLUVIUM:** silty sand, dry, loose, medium brown
1					CL		**COLLUVIUM:** sandy clay, medium stiff, damp, red brown
2					SM		**DECOMPOSED GRANITE:** silty coarse sand, dense to very dense, damp, yellow gray; fractured
3							
4							
5							Bottom of trench at 4.5 feet
6							
7							
8							
9							
10							
11							
12							
13							
14							

Remarks:

Please refer to symbols and note limitations shown on "Explanation of Logs"

SHEPARDSON ENGINEERING ASSOCIATES INC.

Geotechnical Consultants: Engineers-Geologists

Date: June, 2004 | Project No:: 204135-01

Log of Test Trench TP- 6

Hanson Lane

Plate B7 1 of 1

TR1 04

LOG OF TEST TRENCH TP- 7

Date Excavated: 5/20/04 Excavation Equipment: Case 580 Extendahoe

Logged By: BMH Method/Trench Width: Backhoe/18" Elevation: ~1490'

Depth (feet)	Sample Type	Dry Density (pcf)	Moisture Content (%)	Lab Tests	USCS	Graphic Log	MATERIAL DESCRIPTION
0					SM		COLLUVIUM: silty sand, loose, damp, medium brown
1					CL		COLLUVIUM: sandy clay, medium stiff, wet, red brown
2							
3					SM		WEATHERED METASEDIMENTARY BEDROCK: silty sand, dense, moist, orange gray and yellow; easily excavated
4	B			MD,DS			
5							
6							
7							
8							
9							
10							
11							Bottom of trench at 11 feet
12							
13							
14							

Remarks:

Please refer to symbols and note limitations shown on "Explanation of Logs"

SHEPARDSON ENGINEERING ASSOCIATES INC.

Geotechnical Consultants: Engineers-Geologists

Date: June, 2004 Project No.: 204135-01

Log of Test Trench TP- 7

Hanson Lane

Plate B8 1 of 1

TR1 04

LOG OF TEST TRENCH TP- 8

Date Excavated: 5/20/04 Excavation Equipment: Case 580 Extendahoe

Logged By: BMH Method/Trench Width: Backhoe/18" Elevation: ~1515'

Depth (feet)	Sample Type	Dry Density (pcf)	Moisture Content (%)	Lab Tests	USCS	Graphic Log	MATERIAL DESCRIPTION
1					CL		COLLUVIUM: sandy clay, medium stiff, wet, medium brown
2					SM		WEATHERED METASEDIMENTARY BEDROCK: silty sand, dense, moist, orange, yellow gray and light gray
3							
4							
5							
6							
7							
8							
9							
10							
11							Bottom of trench at 11 feet
12							
13							
14							

Remarks:

Please refer to symbols and note limitations shown on "Explanation of Logs"

SHEPARDSON ENGINEERING ASSOCIATES INC.

Geotechnical Consultants: Engineers-Geologists

Date: June, 2004 | Project No.: 204135-01

Log of Test Trench TP- 8

Hanson Lane

Plate B9 1 of 1

TR1 04

APPENDIX C

EXPANSION INDEX TEST RESULTS

Sample Location	Initial Moisture (%)	Compacted Dry Density (pcf)	Final Moisture (%)	Expansion Index	Expansive Classification
TP- 3 @ 2.0	12.7	98	32.5	174	Very High

Classification of Expansive Soil (ASTM D 4829-88, EI @ 50% sat. estimated)

Expansion Index	Potential Expansion
0 - 20	very low
21 - 50	low
51 - 90	medium
91 - 130	high
130+	very high

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Geotechnical Consultants: Engineers-Geologists

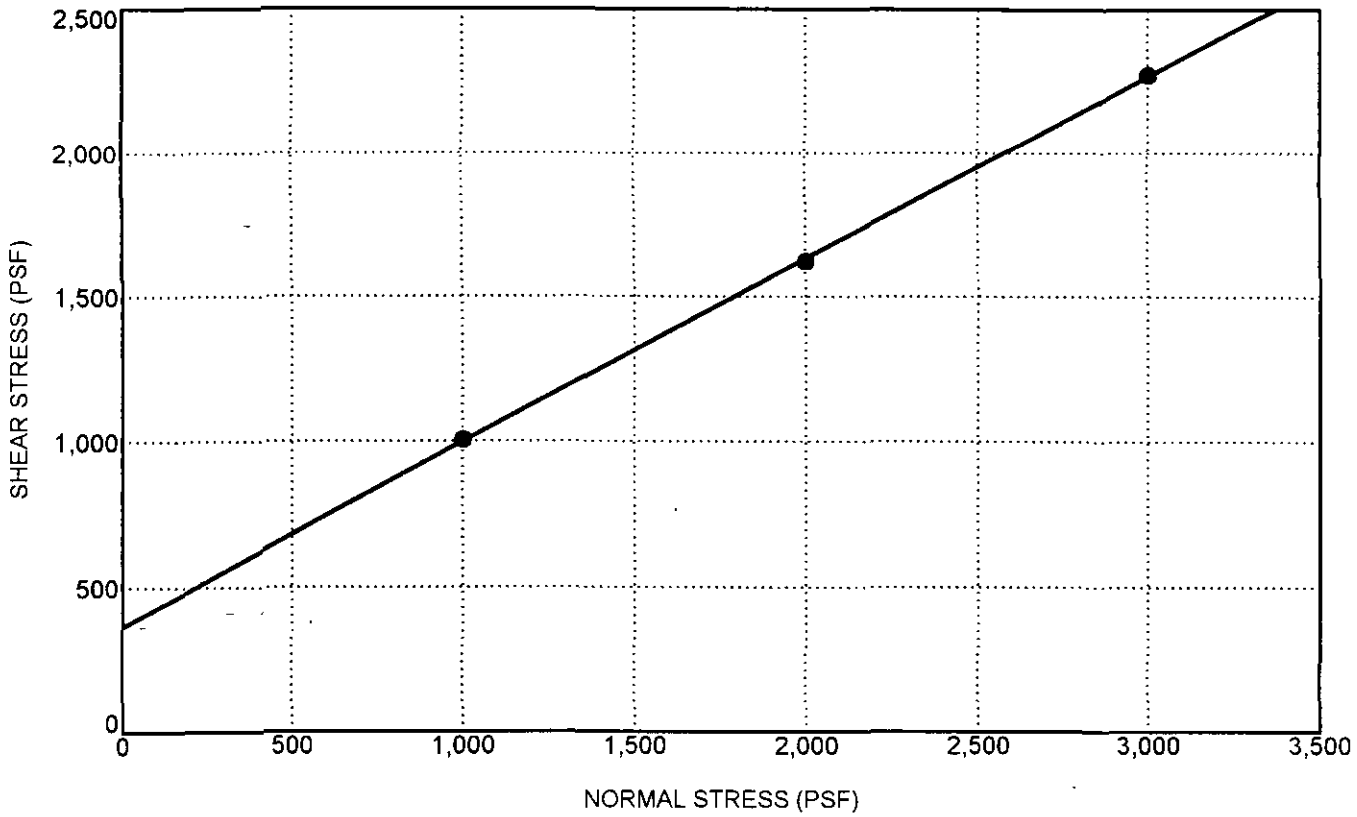
Date: June, 2004 | Project No.: 204135-01

Expansion Index Test

Hanson Lane

Plate C1

EIT 04



Sample Location and Depth (feet):	TP- 7 @ 4.0
Soil Type and Visual Description:	Yellow Brown Silty Sand W/Gravel
Sample Type/Sampling Method*:	Remolded / B
USCS Group Symbol and Name:	

Test Data

MOISTURE CONTENT (%)**		DRY DENSITY (pcf)**	
Initial Test:	9.3	Initial Test:	113
Final Test:	17.5		
TEST CONDITIONS:		(C,D,S)	
NORMAL LOADS (psf):		1000,2000,3000	
STRAIN RATE (in/min):		0.0010	

Results

INTERNAL FRICTION ANGLE (degrees)		APPARENT COHESION (psf)	
Peak:	32	Peak:	367
Ultimate:	33	Ultimate:	249

* See Explanation of Logs for sampler symbol definitions.

** Average of three test points.

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Geotechnical Consultants: Engineers-Geologists

Date: June, 2004 | Project No.: 204135-01

Direct Shear Test

Hanson Lane

Plate C2

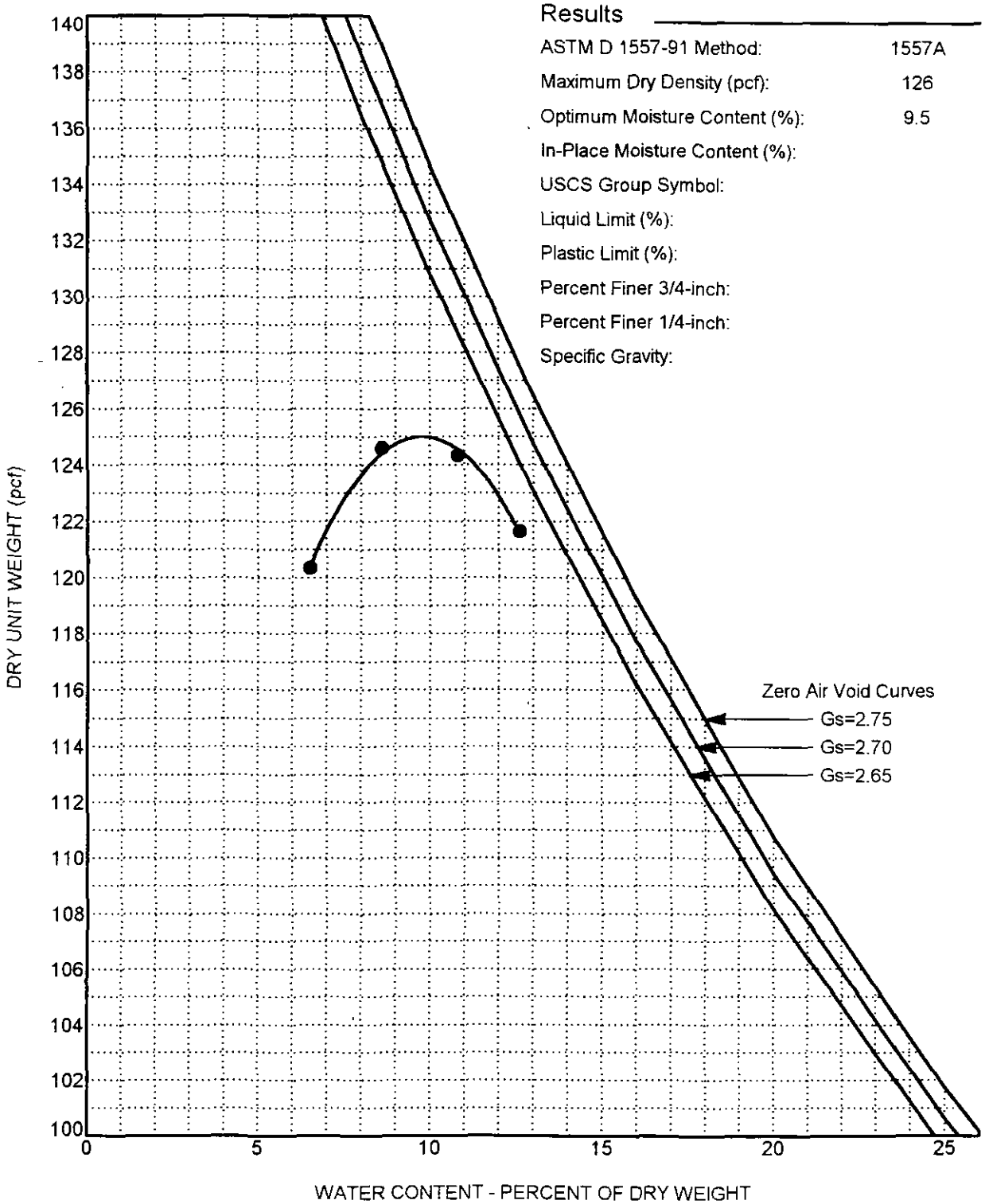
DS1 04

Sample Location and Depth (feet): TP- 7 @ 4.0

Soil Type and Visual Description: Yellow Brown Silty Sand W/Gravel,

Results

ASTM D 1557-91 Method:	1557A
Maximum Dry Density (pcf):	126
Optimum Moisture Content (%):	9.5
In-Place Moisture Content (%):	
USCS Group Symbol:	
Liquid Limit (%):	
Plastic Limit (%):	
Percent Finer 3/4-inch:	
Percent Finer 1/4-inch:	
Specific Gravity:	



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Geotechnical Consultants: Engineers-Geologists

Date: June, 2004 | Project No.: 204135-01

Compaction Curve

Hanson Lane

Plate C3

CP1 04

APPENDIX D

RECOMMENDED GUIDE FOR PLACEMENT OF ENGINEERED FILL

1.0 GENERAL

1.1 Purpose

The intent of this guide is to outline procedures for placing engineered fill soil to the lines and grades shown on the approved plans. The recommendations contained in the preliminary geotechnical investigation report prepared by Shepardson Engineering Associates, Inc. are a part of this guide and would supersede the provisions contained in the guide in the case of conflict.

1.2 Definition of Terms

- **Fill**: All soil or rock material placed by man to raise the natural grade of the site or to backfill an excavation.
- **Onsite Material**: Soil and/or rock obtained from excavations within the boundaries of the project.
- **Import Material**: Soil and/or rock hauled in from offsite.
- **Engineered Fill**: Fill which has been placed under the properly documented observation and testing of a Geotechnical Engineer.
- **ASTM Specifications**: Specifications contained in the latest edition of the Standard Specifications of the American Society for Testing and Materials.
- **Relative Compaction**: The ratio, expressed as a percentage, of the in-place dry density of a soil, to the maximum dry density of the same material based on specific test procedures referenced in the preliminary geotechnical investigation report.
- **Geotechnical Report**: The soil and geologic reports (including addendums) were prepared specifically for the development of the project. The owner should confirm that this report is current and valid for the project as presently planned.
- **Geotechnical Engineer**: A registered professional Civil Engineer authorized by the State of California to use the title Geotechnical Engineer (G.E.).
- **Engineering Geologist**: An Engineering Geologist certified by the State of California.
- **Design Civil Engineer**: A California Registered Professional Civil Engineer responsible for the preparation of the grading plans and as-built topographical surveys.

1.3 Testing and Observations

The person responsible for the quality of the fill placement should employ a qualified Geotechnical Engineer to provide observation and testing of the fill construction.

The Geotechnical Engineer should, when under contract, observe the grading operations during both preparation of the site and construction of any engineered fill. He should perform a sufficient number of field observations and tests to form an opinion regarding the conformance of the site preparation, the suitability of the fill material, and the extent to which the results of the testing indicate that the degree of compaction of the constructed fill meets the project specification. The Geotechnical Engineer will inform the owner if the fill does not meet the specifications and can assist in determining the limits of fill not meeting specified requirements. It is the responsibility of the contractor and owner to keep the Geotechnical Engineer notified regarding work schedules and changes in the project, or plans.

It is the sole responsibility of the contractor to determine the nature of the work and the equipment/method required to adequately perform all work in accordance with applicable codes/ordinances, the Geotechnical Report and the contract documents.

1.4 Existing Soil Conditions

A geotechnical investigation has been performed for this site. The contractor should familiarize himself with geotechnical conditions at the site, whether covered in the report or not, and acknowledge his understanding of all findings, conclusions, and recommendations associated with the grading, or make a written request to the owner for appropriate clarification.

2.0 SITE PREPARATION

2.1 Clearing

Prior to excavating or filling all brush, vegetation, rubbish, debris and topsoil should be removed or otherwise disposed of so as to leave the areas to be filled free of vegetation and debris. Any soft and/or wet spots should be corrected by draining and/or removal of the unsuitable material. The limits to which removal will be extended should be determined by the Geotechnical Engineer. Grubbing consists of the removal of all tree stumps, roots or other projections larger than 2 inches to a depth at least 3 feet below finished grade. Topsoil may be stockpiled for reuse subject to evaluation by the Geotechnical Engineer. Any asphaltic pavement materials removed during clearing should be disposed of offsite. Concrete fragments, free of reinforcing, may be incorporated into fill providing the size, distribution, and placement meets the provisions herein.

2.2 Site Preparation

The ground to receive fill or improvements should be excavated of all loose and porous soil to the depth recommended by the Geotechnical report. The natural ground exposed at the level which is determined to be satisfactory for the support of the fill should then be plowed or scarified to a depth of at least six inches and until the surface is free from ruts, hummocks, or other uneven features which inhibit uniform compaction by the equipment to be used. The scarified ground should be brought to the recommended moisture content and compacted to the minimum relative compaction specified in the investigation report. Where undisturbed dense bedrock is exposed at the surface, scarification and recompaction may be omitted if acceptable to the Geotechnical Engineer.

2.3 Benching

Where fill is placed on hillsides or exposed slope areas, the existing surface soil should be removed. The depth of removal will vary based on site-specific conditions. If existing slopes are steeper than five horizontal to one vertical (i.e., 20%), horizontal benches should be cut into firm and competent undisturbed soil or bedrock in accordance with illustration on the attached "Standard Grading Guidelines." The width and frequency of the subsequent, higher benches may be varied by the Geotechnical Engineer based on ground conditions and steepness of slope. The new horizontal portion of each bench should be compacted prior to receiving fill. Ground slopes flatter than 20% should be benched when recommended by the Geotechnical Engineer. The benches should be constructed with the surface inclined at not less than 2% gradient into the slope.

2.4 Subdrains

Canyon subdrains should be installed where recommended by the Geotechnical Engineer. Details for subdrain construction are provided in the investigation report.

3.0 FILL MATERIAL AND SPECIAL REQUIREMENTS

3.1 The fill should consist of soil material approved for use by the Geotechnical Engineer or his representative. This material may be obtained from the onsite excavation areas and any other approved sources, or by blending soil from one or more sources. Samples of proposed import fill should be submitted to the Geotechnical Engineer for review and testing at least five working days prior to its importation.

3.2 Fill material should consist of soil so graded that at least 40% by dry weight of the material passes a standard No. 4 sieve. Soil with greater than low expansion potential should not be placed within the upper four feet of the fill unless and placement is provided for in the preliminary geotechnical investigation, or specific acceptance by the Geotechnical Engineer is obtained. A definition of the expansion potential is presented in the investigation report. The material used should be free of organic matter and other deleterious substances, and should not contain rocks or lumps greater than twelve inches in least dimension except as provided for in the investigation report. Soil with objectionable characteristics should be disposed of offsite or in nonstructural fill areas, as defined by the project Design Civil and/or Geotechnical Engineer. The Geotechnical Investigation Report may also specify additional soil suitability parameters for the fill.

3.3 During grading operations, testing may be performed to further determine the physical characteristics of the fill. Any special treatment recommended as a result of this testing should become an addendum to this guide. Boulders greater than twelve inches in least dimension, or the thickness of the compacted lift, whichever is least, should be placed in accordance with the "Rock Disposal Detail" presented in the investigation report. Continuous observation and testing by the Geotechnical Engineer is a necessity during rock disposal operations.

3.4 All fill material shall be free of hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Article 9 and 10: 40CFR and any other applicable local, state, or Federal regulations. The Geotechnical Engineer is not responsible for the identification of possible hazardous material. The Geotechnical Engineer may however observe soil discoloration, odor or other indicators that may prompt him to recommend that the owner terminate grading operations in the suspect area, and assess the conditions prior to proceeding.

3.5 Unexpected soil and/or groundwater conditions differing from those identified in the Geotechnical Report may be encountered by the contractor during grading. Such conditions shall be brought to the immediate attention of the Geotechnical Engineer for appropriate action.

4.0 PLACING, SPREADING AND COMPACTING FILL MATERIAL

4.1 The engineered fill material should be placed in approximately level layers which, when compacted, do not exceed approximately eight inches in thickness, or less if necessary to obtain uniform, minimum specified relative compaction. Each loose layer should be spread evenly and thoroughly mixed during the spreading to promote both uniformity of material and moisture content.

4.1.2 When the moisture content of the fill material is below that recommended by the Geotechnical Engineer, water should be uniformly added and blended until the moisture content is satisfactory. When the moisture content of the fill material is above that recommended by the Geotechnical Engineer, the fill material should be aerated by blending, scarifying, or other satisfactory means until the moisture content is satisfactory. Fill, with a moisture content outside the recommended limits, is normally considered unsuitable.

4.1.3 After each layer has been placed, mixed and spread evenly, it should be thoroughly compacted to not less than 90% or the minimum relative compaction as referenced to ASTM D1557. Compaction equipment should be of such design so as to compact the fill material to at least the recommended density in a continuous and uniform manner over the entire area.

4.1.4 Fill slopes should be compacted by a means of sheepsfoot and grid rollers. Compacting of the slope face should be accomplished by uniformly backrolling the slopes in maximum 4 feet fill height intervals of elevation gain, or other methods producing satisfactory results to a relative compaction of at least 90% followed by grid-rolling. Overbuilding and compacting the fill slope beyond the finished slope line with subsequent trimming of all excess material is an acceptable alternate method.

5.0 TRENCH BACKFILL

Trench excavations for utility lines and pipes should be accomplished to the line and grade shown on the project plans. The utility line or pipe should be properly bedded by backfilling the space under and around the pipe with clean sand or approved granular soil to a depth of at least one foot over the top of the pipe. The sand backfill should be uniformly compacted in place before the engineered backfill is placed on the sand bedding.

The soil material accepted by the Geotechnical Engineer for use as backfill over the pipe, should be watered and mixed as necessary prior to placement. The backfill should be compacted to a density equivalent to at least 90% of the maximum laboratory dry density determined by the Geotechnical Engineer.

In-place density tests and observations of the backfill procedures should be made by the Geotechnical Engineer during backfilling. The contractor should provide test holes and exploratory pits required by the Geotechnical Engineer during backfilling. The contractor should provide test holes and exploratory pits required by the Geotechnical Engineer to permit sampling and testing. Shoring and/or sloping of the test holes should be provided by the contractor when the trench depth exceeds five (5) feet.

6.0 TREATMENT AFTER COMPLETION OF GRADING

After grading is completed and the Geotechnical Engineer has finished his observations of the work, no further excavation of filling should be done, except with the advanced notification of, and under the observation of, the Geotechnical Engineer.

It is the responsibility of the contractor to prevent erosion of the freshly graded area during construction and until such time as permanent drainage and erosion control measures have been installed and established. Surface drainage should be maintained during and following construction to avoid damage to the site or adjoining properties.

7.0 SEASONAL LIMITS

No fill material should be placed, spread or rolled while it is at an unsuitably high moisture content, or during unfavorable weather conditions. When the work is interrupted by rain, fill operations should not be resumed until tests by the Geotechnical Engineer indicate that the moisture content and density of fill already placed are still within recommended limits. The contractor must control surface water to avoid damage to finished work on the site or adjacent property.

8.0 UNFORESEEN CONDITIONS

In the event that site or soil conditions are encountered during site preparation and construction that were not encountered during the preliminary geotechnical investigation, the Geotechnical Engineer should be notified immediately to permit evaluation and submittal of alternative recommendations as needed. The Geotechnical Engineer should be notified of any significant changes in the proposed site grading.

9.0 REPORTING

Upon completion of the work, Contractor should furnish Owner a certification by the Design Civil Engineer stating that the lots and/or building pads are graded to within proper tolerance of elevations shown on the grading plans and that all tops and toes of slopes are also within tolerance of the positions shown on the grading plans. After installation of a section of subdrain, the project Design Civil Engineer should survey its location and prepare an as-built plan of the subdrain location. The project Design Civil Engineer should verify the proper outlet for the subdrains and the Contractor should ensure that the drain system is free of obstructions.

The Owner is responsible for furnishing a final as-graded geotechnical report to the appropriate governing or accepting agencies. The as-graded report should be prepared and signed by a Geotechnical Engineer and, and if necessary by a California Certified Engineering Geologist, indicating that the geotechnical aspects of the grading were performed in substantial conformance with the Specifications or approved changes to the Specifications.

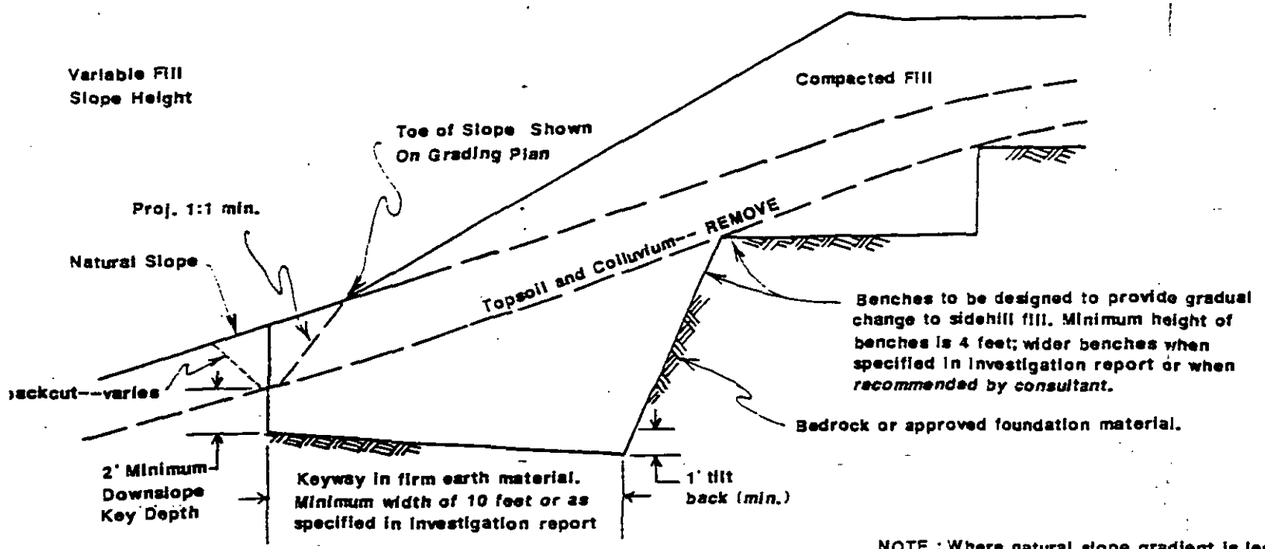


Figure No. 1

TYPICAL SIDEHILL FILL MASS ABOVE NATURAL SLOPE

NOTE : Where natural slope gradient is less than 5:1, the necessity for benching shall be determined by the consultant.

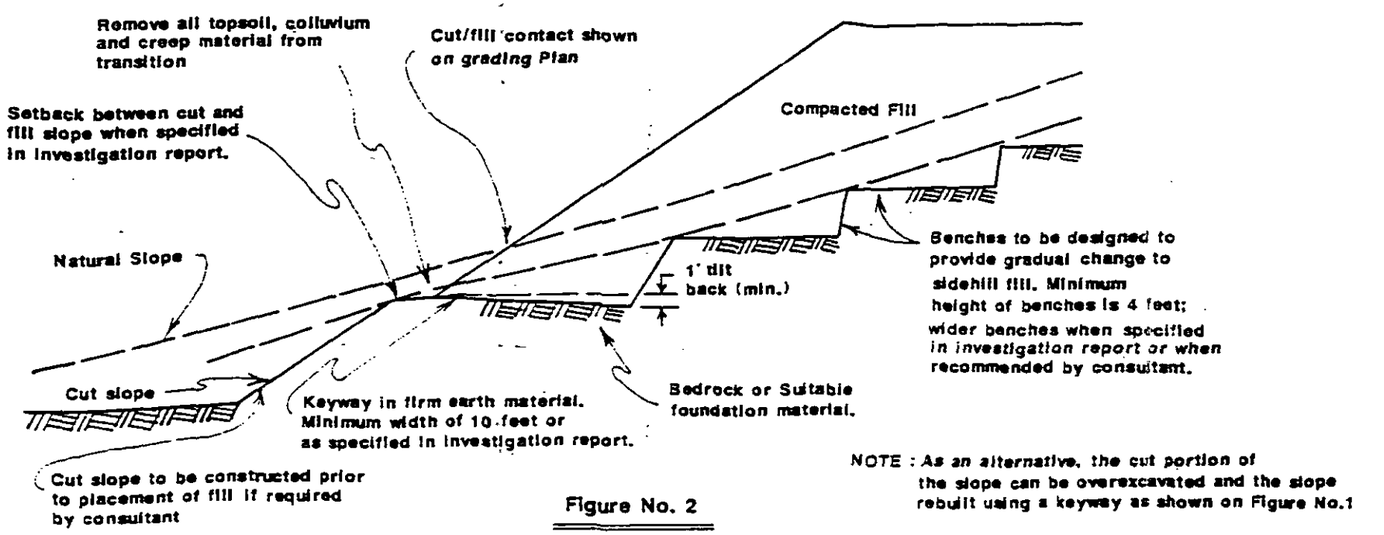
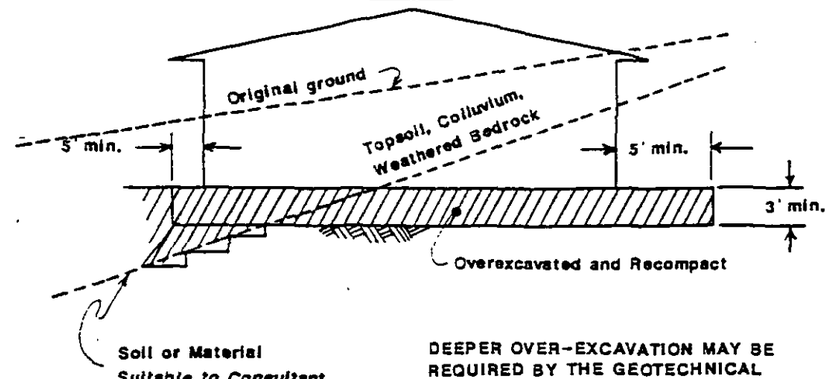


Figure No. 2

TYPICAL SIDEHILL FILL MASS ABOVE EXISTING CUT SLOPE

NOTE : As an alternative, the cut portion of the slope can be overexcavated and the slope rebuilt using a keyway as shown on Figure No.1

a) CUT LOT



DEEPER OVER-EXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL ENGINEER IN STEEP TRANSITIONS.

b) CUT-FILL LOT (TRANSITION)

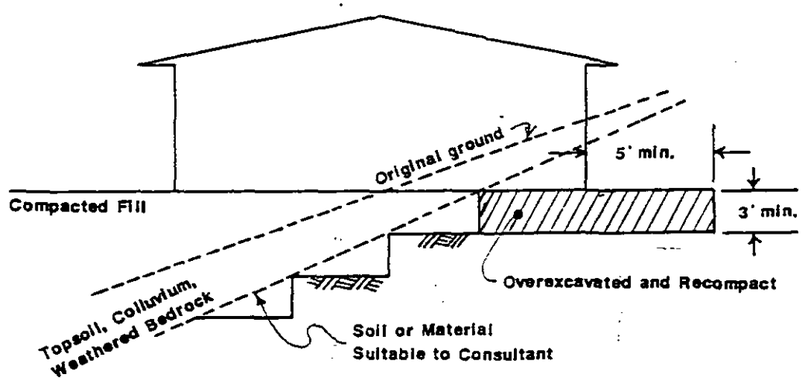


Figure No. 3

STRIPPING DETAIL-REMOVAL OF DAYLIGHT LINE

NOTE : For additional details refer to the text of the Geotechnical Investigation Report and the Recommended Guide for Placement of Engineered Fill. Backdrains may be required based on consultant's observations.

SHEPARDSON ENGINEERING ASSOCIATES INC.
Geotechnical Consultants:
Engineers-Geologists

Job Number: | Date:

STANDARD GRADING GUIDELINES

Plate

SEA R-171 Rev. 4/88